

Claims

**What is claimed is:**

- 1        1. A power system (8) for providing uninterrupted  
2        electric power to a critical load (14), comprising:  
3                a. a first power source (10) providing sufficient  
4        power to supply the critical load (14);  
5                b. a second power source (18) comprising at least  
6        one fuel cell power plant (18), the second power  
7        source providing sufficient power to supply the  
8        critical load (14) and adapted to be normally  
9        substantially continuously connected and providing  
10      power to, the critical load (14);  
11                c. a static switch (19) for selectively  
12      connecting and disconnecting the first power source  
13      (10) to the second power source (18) and (to) the  
14      critical load (14); and  
15                d. a switch controller (49, 45) for controlling  
16      the state of the static switch (19) to connect the  
17      first power source (10) with the critical load (14)  
18      and the second power source (18) during normal  
19      operation of the first power source (10) and to rapidly  
20      disconnect the first power source (10) from the  
21      critical load (14) and the second power source (18) if  
22      and when operation of the first power source (10)  
23      deviates beyond a limit from normal.
  
- 1        2. The power system (8) of claim 1 wherein the switch  
2        controller (49, 45) additionally controls the state of  
3        the static switch (19) to rapidly reconnect the first  
4        power source (10) with the critical load (14) and the  
5        second power source (18) when the first power source  
6        (10) returns to normal operation.

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1       **3.**The power system (8) of claim 1 wherein the second  
2       power source (18) comprises only one or more fuel cell  
3       power plants (18).

1       **4.**The power system (8) of claim 1 wherein the static  
2       switch (19) is a solid-state device.

1       **5.**The power system (8) of claim 4 wherein the solid-  
2       state device is a thyristor (19).

1       **6.**The power system (8) of claim 1 wherein the first  
2       power source (10) is a utility power grid and wherein  
3       each fuel cell power plant (18) includes a power  
4       conditioning system (PCS) for configuring operation of  
5       the respective fuel cell (18) in a grid connected mode  
6       or in a grid independent mode in response to mode  
7       control signals (D1/401', D2/402'), and including a  
8       site management controller (31) connected intermediate  
9       the switch controller (49, 45) and the power  
10      conditioning system (PCS) and responsive to preliminary  
11      mode signals (M1/401, M2/402) from the switch  
12      controller (49, 45) for providing the mode control  
13      signals (D1/401', D2/402') to the fuel cell power  
14      conditioning system (PCS), whereby the fuel cell power  
15      plants (18) rapidly transition operation between the  
16      grid connected and the grid independent modes.

1       **7.**The power system of claim 6 wherein the rapid  
2       disconnection of the first power source (10) from the  
3       critical load (14) and the second power source (18),  
4       and the rapid transitioning of operation of the at  
5       least one fuel cell (18) between the grid connected  
6       mode and the grid independent mode occurs within an  
7       interval of about 4 milliseconds.

1       **8.** The power system of claim **1** wherein the rapid  
2       disconnection of the first power source (**10**) from the  
3       critical load (**14**) and the second power source (**18**)  
4       occurs within an interval of about 4 milliseconds.

*S1*  
*X2*

1       **9.** A power system (**8**) for providing substantially  
2       continuous electric power to at least a critical load  
3       (**14**), comprising:  
4              a. a utility grid power source (**10**) providing  
5       sufficient power to supply the critical load (**14**);  
6              b. at least one fuel cell power plant (**18**)  
7       operating substantially continuously for providing at  
8       least sufficient power to supply the critical load  
9       (**14**), the at least one fuel cell power plant (**18**)  
10      including a power conditioning system (**PCS**) for  
11      configuring operation of the respective fuel cell (**18**)  
12      in a grid connected mode or in a grid independent mode  
13      in response to mode control signals (**D1/401'**, **D2/402'**),  
14      the at least one fuel cell power plant (**18**) being  
15      normally substantially continuously connected and  
16      providing power to, the critical load (**14**);  
17              c. a static switch (**19**) for selectively  
18      connecting and disconnecting the grid power source (**10**)  
19      to the at least one fuel cell power plant (**18**) and to  
20      the critical load (**14**);  
21              d. a switch controller (**49, 45**) for controlling  
22      the state of the static switch (**19**) to connect the grid  
23      power source (**10**) with the critical load (**14**) and the  
24      at least one fuel cell power plant (**18**) during normal  
25      operation of the grid power source (**10**) and to  
26      disconnect, within a 4 millisecond interval, the grid  
27      power source (**10**) from the critical load (**14**) and the

28 at least one fuel cell power plant (18) when the grid  
29 power source deviates beyond a limit from normal; and  
30 e. a site management controller (31) connected  
31 between the switch controller (49, 45) and the power  
32 conditioning system (PCS) and responsive to preliminary  
33 mode signals (M1/401, M2/402) from the switch  
34 controller (49, 45) for providing the mode control  
35 signals (D1/401', D2/402') to the fuel cell power  
36 conditioning system (PCS) to cause the at least one  
37 fuel cell power plant (18) to rapidly transition  
38 operation, within a 4 millisecond interval, between the  
39 grid connected mode and the grid independent mode.

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